

Date: Wednesday, 30/07/2008 9:00:49 AM  
 User: Julie Lecocq

## Process Sheet

Customer : CU-DAR001 Dart Helicopters Services

Drawing Name : BUBBLE WINDOW, RH

Job Number : 40803

Estimate Number : 11394

P.O. Number :

This Issue : 30/07/2008

S.O. No. :

Prsht Rev. : NC

First Issue : / /

Type : THERMOFORMING

Previous Run : 40743

Part Number : D32692

Drawing Number : D3269

Project Number : N/A

Drawing Revision : D

Material :

Due Date : 06/08/2008

Qty: 3, 1 Um: Each

Written By :

Checked &amp; Approved By :

Comment :

08.07.30  
 Est. A 05.03.22 New issue KJ/JLM  
 Est. B 05.05.09 Added engraving EC  
 Est Rev: 06-07-03 As per Rev C JLM  
 Est. C 07.11.06 Thermoform in-house DL verified by: EC  
 Est. Rev: D 08.07. 24 As per New Tool DL

PROTOTYPE

CERTIFICATE OF CONFORMITY  
 REQUIRED

## Additional Product

Job Number:



Seq. #:

Machine Or Operation:

Description :

1.0

HAND FINISH TH

HAND FINISHING THERMOFORMING



Comment: HAND FINISHING THERMOFORMING

Set up Clamping Frame and Load Program  
 as per Folio FTA 014

Wh. 08.07.30

2.0

MACRYLICS177

0.177" PLEXIGLAS G CLEAR CAST ACRYLIC SH



MACRYLIC .125  
 "PLEXI G"



Comment: Qty.: 10.0000 sf(s)/Unit Total: 10.0000 sf(s)  
 0.177" PLEXIGLAS G CLEAR CAST ACRYLIC SH

Wh. 08.07.30

1) Batch # M 108344

3.0

HAND FINISH TH

HAND FINISHING THERMOFORMING



Comment: HAND FINISHING THERMOFORMING

1) Cut Blanks to 30" by 48"

BB 08/07/30 X3

4.0

THERMOFORMING

THERMOFORMING MACHINE



Comment: THERMOFORMING MACHINE

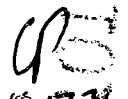
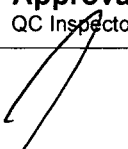
Thermoform as per Dwg. D3269 and Folio FTA 014

Dwg. Rev. \_\_\_\_\_

Folio Rev. \_\_\_\_\_

BB 08/07/30 X3

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng Prod Mgr	Approval QC Inspector
08.07.30	2.	USE MACRYLICS .125" instead of .0.127" FOR TESTING ONLY	W.	08.07.30.		 08-07-31 QSI 042	 08-08-01

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 30/07/2008 9:00:49 AM  
User: Julie Lecocq

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BUBBLE WINDOW, RH

Job Number: 40803

Part Number: D32692

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

QC2

INSPECT PARTS AS THEY COME OFF MACHINE



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

- 1) Check Surface finish for undesired marks, voids, dimples etc.
- 2) Check depth of bubble to ensure conformity to drawing tolerances.

xl →  
P10  
DL 08.07.30.

6.0

QC8

SECOND CHECK

**ENGINEERING  
APPROVAL**



Comment: SECOND CHECK

UP 08.07.30

7.0

HAND FINISH TH

HAND FINISHING THERMOFORMING



Comment: HAND FINISHING THERMOFORMING

- 1) Trim off excess flange material
- 2) Buff out any light scratches or blemishes
- 3) Etch part number and batch number

BB 08/07/30 (X1)

8.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

08-08-01

- 1) Visually inspect for clarity, and proper formation.

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

ENG USE ONLY

UP 08.07.31

10.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

08/06/09

Job Completion



00114A

W 08/08/06

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08.07.30	5.	All Parts used for engineering.	<p>CP</p> <p>08.08.01 PC</p> <p>08.07.30</p>	Scrap All 3 Windows after completion of tests.	<p>08.07.30</p> <p>Wh.</p>	<p>08.08.01</p> <p>PC</p> <p>08.07.30</p>	<p>CP</p> <p>08.08.01 PC</p> <p>08.07.30</p>	<p>08.08.01</p> <p>08.07.30</p>

NOTE: Date & initial all entries



DESIGN <i>qp</i>	DRAWN BY LE	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>qp</i>	APPROVED <i>H</i>	DRAWING NO. DSI 9329	REV. B SHEET 1 OF 1
DATE 06.06.26		TITLE BUBBLE WINDOW INSTALL MOD.	SCALE NTS
A	06.04.25	NEW ISSUE	
B	06.06.26	CHG TO EFFECTIVE AFTER CHG 002	

**DART SERVICE INSTRUCTION**  
TO AMEND INSTALLATION INSTRUCTIONS IIN-D044-713 REV. A  
REF. CANADIAN STC: SH05-13 ISSUE 1  
REF. FAA STC: SR02088NY

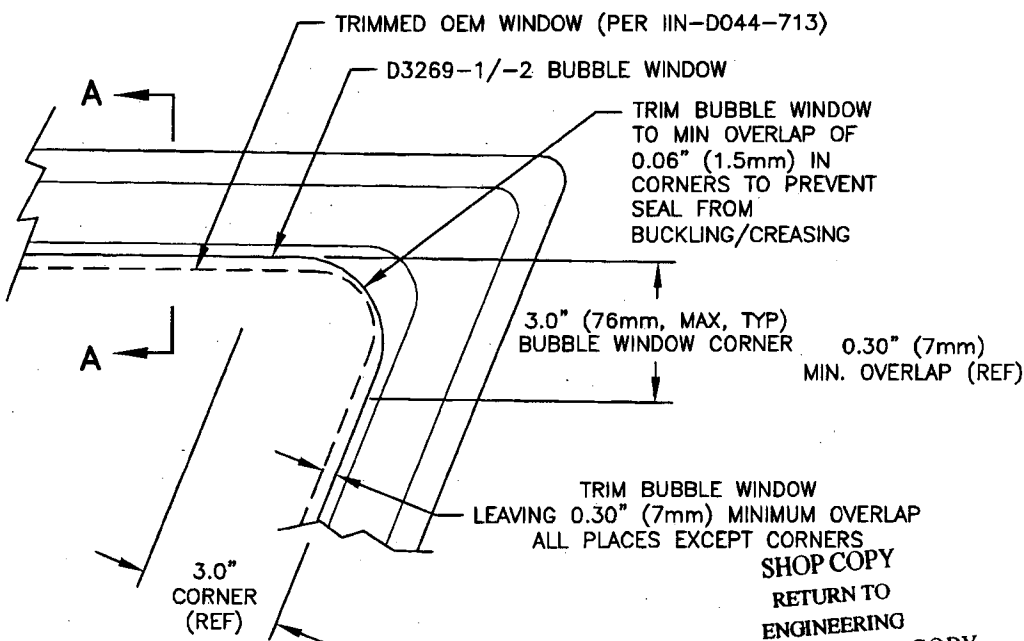
**PURPOSE:** For the D044-713-013/-014 kits supplied after CHG 002, the D3267-1/-2 bubble windows have been supplied untrimmed to allow for easier installation in the field. The installer must trim the windows in accordance with these instructions prior to installation.

**PROCEDURE:**

- 1) Modify the R44 crew door per items 3.2.1 and 3.2.2 of Installation Instructions IIN-D044-713 Rev.A.
- 2) Fit and trim the D3269-1/-2 Bubble Window to match the cutout in the door as follows: The bubble window must be a minimum of 0.30" (7mm) larger than the cutout in the OEM window as shown in the figure below. However, in the corners of the window, it is acceptable to trim a 0.06" minimum overlap (1.5mm) to help prevent the D2126-0903 Seal from buckling/creasing in the corners. The edge of the bubble window must be deburred to a smooth finish.
- 3) Continue installing the bubble window per items 3.2.3 through 3.2.5 of the installation instructions.

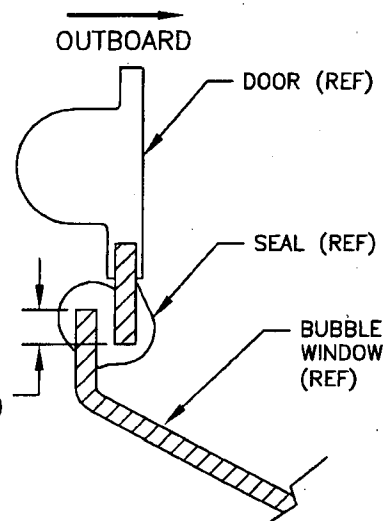
**FIGURE 1**

LOOKING AT INSIDE CORNER OF DOOR



**SECTION A-A**

(NOT TO SCALE)



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WORK ORDER  
NO. 140803

CANADA DEPARTMENT OF TRANSPORT AIRCRAFT CERTIFICATION BRANCH DAO # 01-O-01	
APPROVED	
BY:	<i>[Signature]</i> D. SHEPHERD (DE # 02)
DATE:	06.06.26
CERT. NO.:	SH05-13
ISSUE NO.:	1

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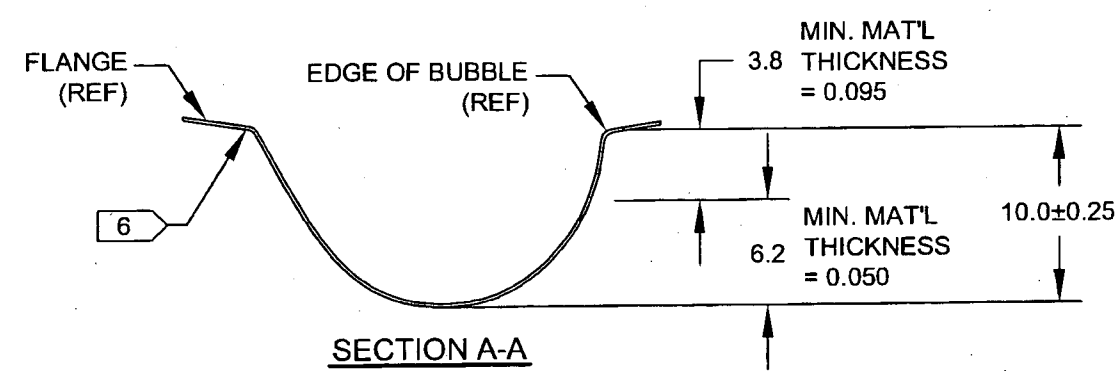
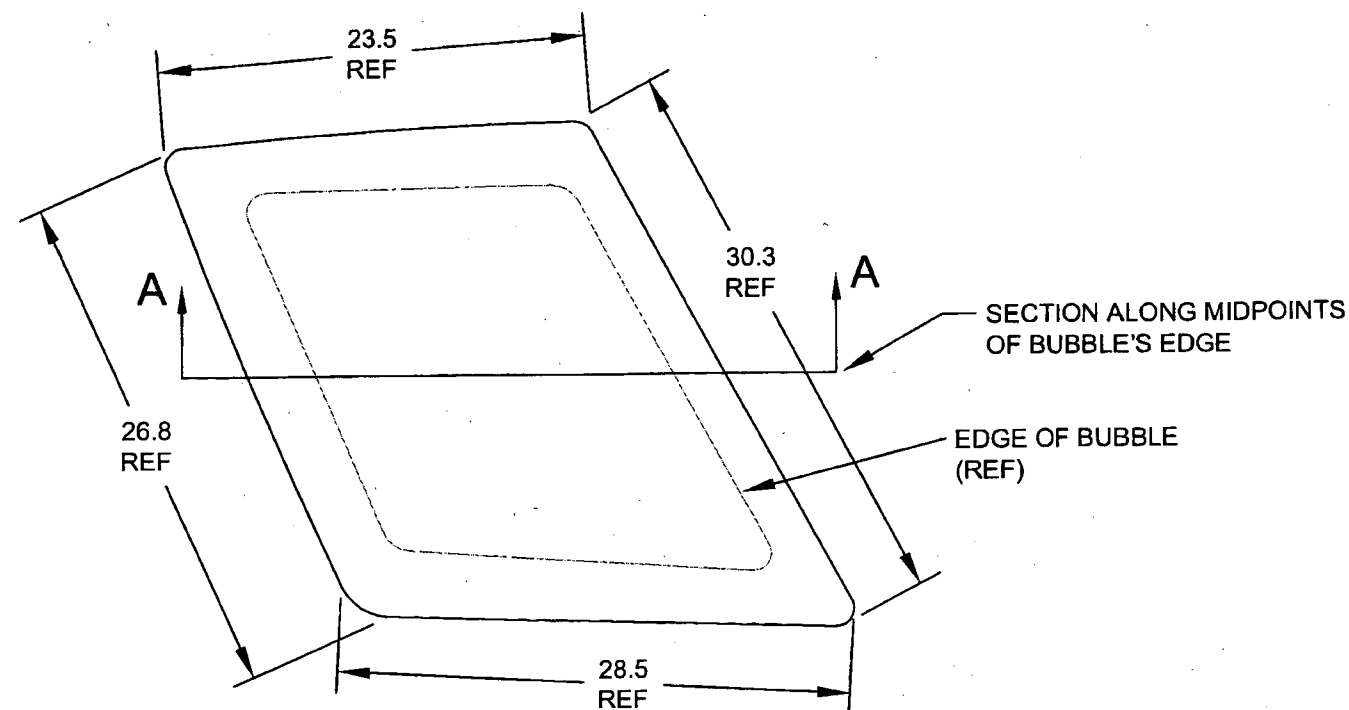
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



D3269-1 BUBBLE WINDOW, LH

**NOTES:**

- 1) MATERIAL: PLEXIGLAS G CLEAR CAST ACRYLIC SHEET PER LP-391 TYPE 1 GRADE C OR POLYCAST II CLEAR ACRYLIC SHEET PER MIL-P-5425 0.177 TO 0.188 THICK (STOCK, REF DART SPEC M-ACRYLIC-S)
  - 2) FINISH: NONE
  - 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED
  - 4) UNITS: INCHES UNLESS OTHERWISE NOTED
  - 5) BREAK SHARP EDGES: 0.010 TO 0.020 MAX
  - 6) IDENTIFICATION: ENGRAVE P/N & B/N ON FLANGE WITHIN 0.25" OF BUBBLE. USE 0.125" LETTERS TO MAX DEPTH OF 0.005".
  - 7) WEIGHT: 4.88 lbs
  - 8) FORM PER D3269-1T1 AND QSI 022
- FORMING PROCESS:
- (a) DRAPE OVER D3269-1T1 MOLD
  - (b) HEAT TO 290°F
  - (c) VACUUM FORM TO SPECIFIED HEIGHT
  - (d) LET COOL TO AT LEAST 100°F BEFORE HANDLING
  - (e) TRIM FLANGE TO PROFILE OF MOLD

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WORK ORDER  
NO. 40805

RELEASED  
08.02.13

D	REFORMAT, CHG OVERALL REF DIMS, CHG FORMING PROC (A8-1, A8-2), MIN WALL WAS 0.100 NOW 0.095 (C6-1, C7-2)	CP	08.02.13
C	NO LONGER TRIMMED	CP	06.06.22
B	UPDATE MATERIAL SPEC.	CP	05.03.10
A	NEW ISSUE	CP	05.02.18
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	08.02.13		

<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D3269	REV. D SHEET 1 OF 2
TITLE BUBBLE WINDOW	SCALE NTS
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SECTION ALONG  
MIDPOINTS  
OF BUBBLE'S EDGE

EDGE OF BUBBLE  
(REF)

B

30.3  
REF23.5  
REF

B

26.8  
REF28.5  
REF

MIN. MAT'L  
THICKNESS  
= 0.095

EDGE OF BUBBLE  
(REF)

FLANGE  
(REF)

10.0±0.25

MIN. MAT'L  
THICKNESS  
= 0.050

6

SECTION B-B

D3269-2 BUBBLE WINDOW, RH

## NOTES

- 1) MATERIAL: PLEXIGLAS G CLEAR CAST ACRYLIC SHEET PER LP-391 TYPE 1 GRADE C  
OR POLYCAST II CLEAR ACRYLIC SHEET PER MIL-P-5425  
0.177 TO 0.188 THICK (STOCK, REF DART SPEC M-ACRYLIC-S)
- 2) FINISH: NONE
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED
- 5) BREAK SHARP EDGES: 0.010 TO 0.020 MAX
- 6) IDENTIFICATION: ENGRAVE P/N & B/N ON FLANGE WITHIN 0.25" OF BUBBLE. USE 0.125" LETTERS TO MAX DEPTH OF 0.005".
- 7) WEIGHT: 4.88 lbs
- 8) FORM PER D3269-2T1 AND QSI 022  
FORMING PROCESS: (a) DRAPE OVER D3269-2T1 MOLD  
(b) HEAT TO 290°F  
(c) VACUUM FORM TO SPECIFIED HEIGHT  
(d) LET COOL TO AT LEAST 100°F BEFORE HANDLING  
(e) TRIM FLANGE TO PROFILE OF MOLD

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08.02.13

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DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. D
MFG. APPR.		D3269	SHEET 2 OF 2
APPROVED		TITLE	SCALE
DE APPR.		BUBBLE WINDOW	NTS
DATE	08.02.13	COPYRIGHT © 2005 BY DART AEROSPACE LTD	
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SABIC  
innovative  
Plastics

سابك  
sabic

**SABIC Polymershapes**

1250 OLD INNES RD. 519 OTTAWA, ONT. K1B 5L3  
TEL: 613 745 7043 FAX: 613 745 8163

## CERTIFICATE OF COMPLIANCE

SOLD TO: DART AEROSPACE

DATE: 16/06/2008

YOUR PURCHASE ORDER 6564

OUR SHIPPER NO: 082867

LINE ITEM #: 1

QUANTITY: 5 Sheets

DESCRIPTION: Plexiglas GM .118 x 48" x 96 P/N 10100505

THESE PARTS WERE MANUFACTURED IN ACCORDANCE WITH:  
Plexiglas GM ASTM D-4802 Formally LP-391

THIS IS TO CERTIFY THAT THE MATERIAL FINISHES AND FUNCTIONAL REQUIREMENTS OF THE ABOVE LISTED PARTS ARE IN ACCORDANCE WITH THE REFERENCE PROCUREMENT SPECIFICATIONS, CONTROL DRAWINGS OR PARTS DESIGNATION AND LATEST REVISIONS AS REFERENCED ON THE SUBJECT PURCHASE ORDER.

SALES REPRESENTATIVE SIGNATURE



ALEXANDRA DAY  
CUSTOMER SERVICE REPRESENTATIVE

*S/*  
*08/06/19*  
*[Signature]*

# DART

## Purchase Order

Date Jun 16, 2008	Page 1
Purchase Order Number PO00006564	

Dart Aerospace Ltd  
1270 Aberdeen St  
Hawksbury, Ontario K6A 1K7  
Phone: (613)632-9577  
Fax: (613)632-1053

**FAKED**  
*CL/10/11/0*

**Vendor Address:**

SABIC Polymershapes  
9150 Airport Road  
Brampton, ON L6S 6G1  
Canada  
Phone (800) -267-1575  
Fax (613) 745-4291

**Ship To:**

Main Finished Goods Location  
Dart Aerospace Ltd  
1270 Aberdeen St  
Hawksbury, Ontario K6A 1K7

Reference	Contact	Vendor Number	PO Date	Terms	Ship Via	Expected Arrival
		VC-GEP001	Jun 16, 2008	N30	Epic Express	Jun 20, 2008

Qty. Ordered	Item Number	Description	Expected Arrival	Drop-Ship	Unit Cost	UOM	Extended Price
160.0000	MACRLICS125	1/8" Polycast II Sheet Comments: MATERIAL: POLYCAST II CLEAR ACRYLIC PER MIL-P-5425 OR PLEXIGLASS "G" CAST ACRYLIC	6/20/2008	No	3.700000	sf	592.00
<div>6/24/18</div> <div>MATERIAL CERTIFICATION REQ'D UPON DELIVERY</div>							
Comments:		<b>Tax Summary:</b> GST 29.60 GSTME 0.00 GSTND 0.00		<b>Less:</b> included tax		0.00	
Entered By: <i>CL</i> CLAVOIE		Subtotal				592.00	
Approved By: <i>[Signature]</i>		Total tax				29.60	
		Total purchase order in					
		CAD Dollars				621.60	

DART AEROSPACE LTD		WORK ORDER:	
Description: R 44 Bubble Window RH		Part Number:	D3269-2
Inspection Dwg: D3269	Rev: D	Page 1 of 1	

# FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

(Step 4) Thermoforming  
Visual Inspection Sign-off

Description	Initials
Depth of bubble within tolerances	W.C.
Acceptable shape definition	W.C.
Free of visual flaws (bumps, cracks, voids, etc.)	W.C.

## (Step 6) Trimming FAI Checklist

Inspect dimensions highlighted on inspection sheet drawing \_\_\_\_\_ Rev. \_\_ and record below

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
depth of bubble 10"	+/- 0.25"	10.250	✓		Tap	
23.5	+/- 0.100		N/A			
26.8	+/- 0.100		N/A			
28.5	+/- 0.100		N/A			
30.3	+/- 0.100		N/A			
top 6.2" of bubble	0.050" Min		0.036"	✓	Cal. ULTRA	SAMPLE
Lower 3.8" of bubble	0.095" Min		0.057"	✓	Cal. ULTRA	SAMPLE

Measured by: W.C.	Audited by: [Signature]	Prototype Approval:
Date: 08.07.30	Date: 10.11.31	Date:

Rev	Date	Change	Revised by	Approved
		New Issue		